SOUTH PENN OIL COMPANY,
MALLORY LOT 6 LEASE
("The Old Powerhouse")
Allegheny National Forest
Oil Heritage ~~Recording Project~~
Watsonville Field
Klondike Vicinity
McKean County
Pennsylvania

HAER No. PA-437

PHOTOGRAPHS

XEROGRAPHIC COPIES OF COLOR TRANSPARENCIES

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Historic American Engineering Record
National Park Service
Department of the Interior
1849 C Street, NW
Washington, DC 20240

ADDENDUM TO:
SOUTH PENN OIL COMPANY, MALLORY LOT 6 LEASE
(The Old Powerhouse)
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HAER PA-437
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WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
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ADDENDUM TO
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(The Old Powerhouse)

HAER No. PA-437

LOCATION: Watsonville Field, Klondike vicinity, McKean County, Pennsylvania
UTM: 17.680562.4635335

DATE OF CONSTRUCTION: ca. 1939

PRESENT OWNER: Allegheny National Forest

PRESENT USE: Interpretive site for the petroleum industry in Allegheny National Forest.

SIGNIFICANCE: Pennsylvania is the birthplace of the petroleum industry, signified by the drilling of Edwin Drake's well near Titusville in 1859. Many widely used techniques of drilling and pumping oil were first developed here in the effort to recover the high-quality "Pennsylvania Grade" oil. One particularly important, and successful, technique perfected in Pennsylvania was "central power" pumping of numerous low-production wells to economically recover small amounts of oil. This method of production flourished between ca. 1890 and ca. 1950, and today there are only scattered remains of the once common pumping technique. The South Penn Oil Company, Mallory Lot 6 Lease is an excellent, rare, intact example of the mature, highly capitalized era of central powers.

HISTORIAN: Michael W. Caplinger, 1997.

PROJECT INFORMATION: The Allegheny Oil Heritage Recording Project was undertaken during the summer of 1997 by the Historic American Engineering Record (HAER, Eric DeLony, Chief), a long-range program to document historically significant engineering, industrial and maritime works in the United States. The program is part of the Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER) Division of the National Park Service, U.S. Department of the Interior. This project was sponsored by cooperative agreements between HABS/HAER, E. Blaine Cliver, Chief; the West Virginia University Institute for the History of Technology and Industrial Archaeology (IHTIA), Dr. Emory Kemp, Director; and Allegheny National Forest (ANF), a unit of the Eastern Region of the U.S. Department of Agriculture (USDA) Forest Service,

John Palmer, Supervisor. The Southwestern Pennsylvania Heritage Preservation Commission, Randy Cooley, Director, provided major funding.

The field work, measured drawings, historical reports and photographs were prepared under the general direction of Christopher Marston, HAER Project Leader, with consultation from Phil Ross, ANF Historian. The field team was led by Eric Elmer, HAER Field Architect Supervisor and Michael Caplinger, IHTIA Historian The team included Arturs Lapins, US/ICOMOS Intern (Latvia); and IHITA delineators Paul Boxley, Scott Daley, Kara Hurst, and Kevin McClung. John T. Nicely produced the large format photography.

See also HAER No. PA-436, "Allegheny National Forest Oil Heritage Recording Project," which provides a broad overview of the history of oil production in Pennsylvania and the history and operation of central well-pumping systems.

INTRODUCTION

While petroleum sometimes would flow from a well under its own pressure, this was not usually the case. Most successful oil wells in Appalachia followed a pattern of high initial production (sometimes hundreds of barrels per day per well) followed by a rapid drop off to a few barrels per day--or week--or nothing at all. Thereafter, the well had to be mechanically pumped to recover any oil. By the 1870s, the "standard" pumping outfit was in use in Pennsylvania. Much of the surface equipment used to drill a well (the engine, bandwheel, and walking beam) could also be used to pump it. This was a one-engine-one-well system in which a steam-powered engine pumped a single well, termed "pumping on the beam."

After a well aged and production leveled off, it required pumping for only a short period, perhaps once or a few times a week.[1] In the decade following the establishment of Drake's well, there was little impetus for pumping low-production wells after their initial outflow, since new fields were continually being discovered and the drillers could simply move on to sink another well. There were exceptions, however, such as when the oil tapped by a well was of extremely high quality. With oil prices extremely low, though, it cost too much to outfit, maintain and equip an installation at each well. As prices began to stabilize in the 1880s, pumping became more feasible, and economization of the process became the key to profitability. This drive for efficiency resulted in the popularization of centrally powered multiple-well pumping systems, which were perfected in Pennsylvania's oil fields.

The essential components of a central power system were: the prime mover, or engine; a power reduction/motion-conversion/power distribution unit (always called the "power" in oil-field parlance, not to be confused with the engine or prime mover), which converted the engine's rotary motion to horizontal reciprocating motion; the shackle lines (also called pull, jerker or rod lines), which transmitted the reciprocating motion from the power out to the pump jacks; the pump jacks, which converted the horizontal reciprocating motion of the rod lines to vertical reciprocating motion; and finally, the sucker rods, which operated valves at the bottom of the well that pumped the oil to the surface. The engine and power required a substantial concrete foundation to resist the immense strains put on the machinery, and both were enclosed in a protective powerhouse. Powerhouses not only lessened the chance for fires, but also held spare parts and tools and gave the pumper and machinery protection from the elements. These equipment configurations were generally called central powers, but the term "jack plant" was also common. With the advent of gas and oil powered engines in the mid 1890s, costs were further lowered since the engine was powered by gas produced from the very wells it was pumping--a sort of low-cost perpetual pumping machine that required little manpower or maintenance to keep in operation. By about 1900, numerous oil-well supply companies had developed standardized systems that could be purchased in part or whole.

Certain factors controlled the use of central powers. Wells had to be relatively shallow, less than 3,000'. While up to forty shallow wells could theoretically be pumped by a well-balanced, high-powered system, fifteen to twenty was a more common number. The wells had to be in relatively close proximity, within a mile. Although the shackle lines could be routed over and

[1] To increase production, a well could be "shot" or "torpedoed" with nitroglycerin to extensively fracture the oil sands at the bottom of the hole.

around difficult terrain, extreme topography could hinder their use and was sometimes better suited to individual wells pumping "on the beam." While central power systems flourished between ca. 1880 and ca. 1950, the "unit pumper," a self-contained pumping machine powered by a small gasoline engine or electric motor, succeeded them.

GEOLOGY

Mallory Lot 6 Lease is located in McKean County, Pennsylvania, and taps the small Mallory pool, part of the Klondike oil field. First discovered in 1887 in the Kane sand, the pool is located at an approximate depth of 1,700'. The wells here were probably drilled about that time, so this is likely the third generation of pumping machinery at the site. The South Penn Oil Company, which later became Pennzoil, constructed the existing plant using new and scavenged materials in 1939. South Penn was the largest producer-company in the region. Mallory Lot 6 Lease is a typical example of the mature, highly capitalized period of central power systems in northwestern Pennsylvania.

The Klondike Field contains a number of small pools (some were pumped by less than 10 wells). This was always a low-production field, and some pools have been altogether abandoned. Each pool produces from the same general Clarendon sand, found between 900' and 1,500', but the petroleum-producing zone within the sand varies across the field. The two most productive zones of the Clarendon sand in this immediate area are called the Watsonville (or Kinzua) sand and the Dewdrop sand.

The Pennzoil operation on Mallory Lot 6 produced from the southern portion of the Watsonville Pool, discovered by L.E. Mallory and Company on August 2, 1896 on Devonian Oil Company Lot 8, Warrant 5572. The discovery well averaged 200 barrels (a barrel holds 48 gallons) of oil per day (BOPD) and produced from the Watsonville sand zone of the Clarendon rock. The pool is approximately 4 miles long and 1 mile wide and is the largest in the Klondike field.[2]

The Watsonville sand is a coarse to very coarse-grained white quartz sand with an average thickness of 10' that is located between 1,100' and 1,450' below the surface. The top 2' is not productive. Wells, which were spaced from 500' to 600' apart, were shot with an average of 20 quarts of nitroglycerine. Initial production levels ranged from 5 to 1,320 BOPD, but most produced around 100 BOPD at first. Settled production probably saw less than 5 BOPD per well.[3]

Seven wells along the southern border of the field were drilled into the oil-producing Dewdrop sand of the Clarendon rock, which is below the Watsonville sand. These produced less than 5 BOPD initially, and probably less than 1 BOPD in settled production. Some of the wells on this site may have produced from this sand.[4]

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[2] William Lytle and Joseph Goth, *Oil and Gas Geology of the Kinzua Quadrangle, Warren and McKean Counties, Pennsylvania*, Pennsylvania Department of Mineral Resources Report Number 62 (Harrisburg: Commonwealth of Pennsylvania, 1970), 28.
[3] Ibid.
[4] Ibid.

Certain areas in the field eventually used waterflooding, but by the late 1960s, only 25 percent of the field was active. A production sheet remaining in the powerhouse from the Pennzoil operation showed an average monthly production of 450 barrels per acre (not per well) during the Mallory power's last year of operation. Pennzoil operated this central power until October 1987.

MACHINERY AND THE POWERHOUSE

The prime mover here is a 40-horsepower Cooper-Bessemer Company gas engine, ca. 1930, with two flywheels and an electric ignition. It is in a wholly intact, immaculate, functional condition with oilers, the flyball governor, and clutch mechanism included. For interpretive purposes, it is currently fired with propane. There is a wooden coolant-water holding tank at the northeast corner of the building that acts as a thermal siphon system and cools the engine cylinder and then releases the heat as the coolant storage tank.

A 15"-wide leather belt from the engine passes through an opening in the engine room wall to a "jack shaft," a doubled pulley that reduces r.p.m. slightly and transfers power to a second leather belt. The second belt passes through an adjustable tensioner to drive a 16'-diameter steel bandwheel power.

The steel bandwheel power is mounted on a heavy rectangular foundation and exhibits double underslung eccentrics. A Manzel force-feed lubricator, standing along the bandwheel and supplying oil to the journal bearings and slip rings through a small pipe, oils it.

Eight rod lines connect to the eccentrics (which create the reciprocating motion), although up to twenty wells may have been pumped here at one time. The rod lines are steel, each 1" thick and 25' long. A system of doll heads and hold-ups carries the lines to the wells. Four stone-boat counter weights around the exterior of the building help balance the load on the bandwheel. The shackle work exhibits a technical refinement not seen in most operations--elaborate "South Penn" hook-offs were a scrap-built safety measure that helped prevent injury to the fingers. A simplex-type direct-lift, underpull pumping jack pumps each well. One or two men who started the engine and pumped the wells two or three times a week maintained and operated this jack plant. A single pumping cycle usually lasted less than two hours. Each well produced less than three barrels of oil per week.

The powerhouse is a utilitarian, elongated, wood-frame building with corrugated steel-sheet siding and roof. From the exterior, the powerhouse appears divided into two sections: the engine room and beltway blending together in one long structure, and on the southern end of the building, the (bandwheel) power covering. With its roomy interior, the Mallory powerhouse was larger than most, and a portion of oversize belt tunnel (which now holds a pedestrian walkway) was likely used as a tool upkeep and storage area. At the north end of the building (the engine room), double doors allowed easy entry. The engine room was walled-off and isolated from the rest of the structure. It was thoroughly fire-proofed with an interior sheet metal lining covering the walls and rafters; the rafters and framing are exposed in the rest of the building. The engine

room floor is concrete, while the rest of the structure has dirt floors. Gas radiators heated the engine room's interior. Two windows on either side of the engine room provided natural light. The beltway had three windows along each wall, and the power section of the structure had three windows along the walls and two on the gable end of the structure.

This site operated into the fall of 1989. As of the writing of this report in 1997, it remained semi-functional. The Allegheny National Forest used the structure as of 1997 for educational purposes.

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